

# **List of U.S. Army Research Institute Research and Technical Publications**

**Fiscal Year 2004  
October 1, 2003 to September 30, 2004  
With Author and Subject Index**

**U.S. Army Research Institute for the Behavioral and Social Sciences  
2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926**

**April 2005**

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Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>APR 2005</b>		2. REPORT TYPE		3. DATES COVERED	
4. TITLE AND SUBTITLE <b>List of U.S. Army Research Institute Research and Technical Publications. Fiscal Year 2004.</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER <b>665801</b>	
6. AUTHOR(S) <b>U.S. Army Research Institute</b>				5d. PROJECT NUMBER <b>MM15</b>	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>U.S. Army Research Institute for the Behavioral and Social Sciences, 2511 Jefferson Davis Highway, Arlington, VA, 22202-3926</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited.</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <b>The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize Soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component. As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period October 1, 2003, to September 30, 2004. It contains the abstract of each publication and the bibliographic information needed to identify a publication. The abstracts have been written, as far as possible, to describe the principal research findings in non-technical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provide access to individual reports and topics. This annotated list for FY 2004 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.</b>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES <b>52</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

## **Foreword**

The means of dissemination of the results of the U.S. Army Research Institute for the Behavioral and Social Sciences' (ARI) research and development/studies and analysis program vary widely depending on the type of work, the subject matter, and the sponsor/proponent. Typically, major findings with immediate policy and procedural implications are briefed to sponsors and proponents in order to enable timely implementation. This is followed up with complete documentation in the form of research and technical publications such as the ones listed here. In many cases, these documents represent the actual item handed off to the sponsor/proponent; this is particularly true of the Research Product category. In other cases, results are published in order to provide a complete record of the work done, and for future reference by researchers doing work in the same or similar areas.

This annotated list for FY 2004 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.

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# **List of U.S. Army Research Institute Research and Technical Publications**

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# List of U.S. Army Research Institute Research and Technical Publications

October 1, 2003 to September 30, 2004  
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## Introduction

The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize Soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component.

As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period October 1, 2003, to September 30, 2004. It contains the abstract of each publication and the bibliographic information needed to identify a publication. The abstracts have been written, as far as possible, to describe the principal research findings in non-technical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provide access to individual reports and topics.

## ARI Publications

ARI publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. During fiscal year 2003, the following types of research and technical reports were issued by ARI:

**Technical Report (TR).** A report of completed research intended primarily for dissemination to researchers.

Research Reports and Technical Reports published by the U.S. Army Research Institute for the Behavioral and Social Sciences are intended for sponsors of research and development (R&D) tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Executive Summary. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or memorandum.

**Research Report (RR).** A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

**Research Product (RP).** A user-oriented report intended to aid Army personnel. Examples are handbooks, manuals, and guidebooks.

**Special Report (S).** A published report on a topic of special interest or in-house research intended primarily for dissemination to a select audience.

**Study Report (SR).** A published report briefly documenting studies and analyses.

**Study Note (SN).** A Study Note may contain or consist of technical text, computer code, diskettes or tapes with software, databases, codebooks or other documentation, raw data, data collection instruments, figures, tables, or any other products that do not concisely convey the import of a project but which must be archived for technical completeness.

**Research Note (RN).** An interim or final report typically of limited interest outside of ARI. It is filed with the Defense Technical Information Center (DTIC) but is not printed. Research Notes usually fall into one of the following categories:

- An in-house report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the Department of Defense (DoD) archive of technical documentation.
- An interim contract report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the DoD archive of technical documentation.
- A final contract report that is of limited interest outside of ARI but must be submitted to DTIC in accordance with Department of the Army regulations to close a contract.
- Material related to a Research Report or Technical Report (detailed tables, graphs, charts, sample forms, and sample training and testing materials) published as a Research Note to economize on printing and distribution.

**Contractor Report (CR).** An interim, or final report by a contractor that meets contractual obligations but is not defined by the other report categories.

## **ARI Distribution**

Initial distribution of these publications is made directly by ARI. Research Reports, Technical Reports, Study Reports, and Research Products are distributed primarily to operational and research facilities and their sponsors in DoD, to other interested Government agencies, and to DTIC; copies of some reports are also sent to libraries participating in the Documents



Expediting Project. Research Notes, Study Notes, and Contractor Reports are filed with DTIC but are not published.

These publications are NOT available from ARI. DoD agencies and contractors can purchase paper copies or microfiche from:

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Defense Technical Information Center  
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Ft. Belvoir, VA 22060-6218  
(703) 767-9030 or DSN 284-9030

Other Government agencies and the general public can obtain unclassified reports from:

U.S. Department of Commerce  
National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161  
(703) 487-4650

**NOTE:** When requesting copies of these reports, use the DTIC accession number (AD - - - - -) appearing in parentheses following the date of publication of each citation.



## **Technical Reports**

### **TR 1139**

#### **Predicting Rapid Decision-Making Processes Required by the Dismounted Objective Force Warrior**

Eliza Beth Littleton and Jared T. Freeman. November 2003. (A419472)

This report was developed under a Small Business Innovation Research Program, Phase I. The technology of the Objective Force Warrior (OFW), though still in the conceptual stage, promises to revolutionize warfare by providing information in unprecedented volume, particularly about the locations of threats and other human participants. Ensuring that Soldiers employ OFW technologies well may require a second revolution that focuses on training decision-making skills of warfighters. Predicting the effects of conceptual OFW technologies on decision makers is challenging. This research addresses this problem by laying the groundwork for a simulator that will accommodate a full research program—from discovering and validating requirements to building training—and enable the Army to observe future technology effects. The work triangulated a series of methods—knowledge elicitation methods, analyses, and exercises on a simulation test bed—to systematically examine and test hypotheses concerning decision making with future battle technologies. Our exercise of the test bed suggests there will be positive effects of the technology, as well as unintended negative effects. For example, we observed that threat-sensing technology simulated in this test bed simplified and focused the operation, but may have lulled players into a false sense of confidence in the technology's capabilities.

### **TR 1140**

#### **Training Effectiveness Evaluation of the Full Spectrum Command Game**

Scott A. Beal and Richard E. Christ. January 2004. (A419670)

Fifty-four officers in the Infantry Captains Career Course at Fort Benning, Georgia, participated in a training effectiveness evaluation of a video game named Full Spectrum Command (FSC). Half were assigned to play FSC and participate in normal course work for commanding a light Infantry company in urban offensive operations; the other half did only the normal course work. Pre-FSC measures were for military experience, general cognitive ability, and decision-making style. A questionnaire administered to officers who played FSC documented their sense of personal involvement in the FSC environment, their perception of the training value of the game, and their opinions of FSC strengths and weaknesses. Officers in both groups were assessed individually for the adaptiveness of their decision-making behavior as the commander of a light Infantry company during a tactical exercise using the Janus simulation. Shortcomings in experimental procedures confounded between-groups comparisons for adaptive decision-making behaviors, but other results suggest FSC can provide tactical experiences with potential training value. Prior military experience was related to personal involvement with FSC, perceived training value of FSC, adaptive decision-making behavior in Janus, and decision-making style. Officers who played FSC identified its strengths and changes desired in future versions of the game.

## **Technical Reports**

### **TR 1141**

#### **Coding Verbal Interactions in a Prototype Future Force Command And Control Simulation**

Paula J. Durlach, Laticia D. Bowens, John L. Neumann, and Thomas J. Carnahan. January 2004. (A421089)

As the U.S. Army undergoes transformation, it will need reliable means of measuring and training complex new skills. Acquiring those will require analysis of human behavior in the context of human-in-the-loop simulations of Future Combat Systems (FCS) still in the concept exploration phase. The goal of the present effort was to establish and measure command group behavior observed in such a human-in-the-loop simulation via analysis of the verbal interactions of the command group. A coding scheme for command group verbal interactions was devised and applied to several simulation runs in which a command group of 4 experienced Army Lt. Col.'s controlled an array of simulated unmanned air and ground platforms to accomplish a deliberate attack mission. This report documents the development of the coding scheme, the analysis results, and considers various other approaches for analyzing verbal data.

### **TR 1142**

#### **How Formal Training Affects Soldier Attitudes and Behaviors Towards Digitization**

John S. Barnett. February 2004. (A421864)

This research measured how formal training affects Soldier patterns of behavior and attitudes towards digitization. A set of questionnaires was administered to 24 enlisted Soldiers and 12 officers attending formal classroom training for the Force XXI Battle Command, Brigade and Below (FBCB2) digital system. One questionnaire was administered before training, and a second after training was complete. The questionnaires assessed Soldier opinions of FBCB2 usefulness and also their attitudes associated with using the system. Soldier responses before and after training were compared to assess how training affected their attitudes and behaviors towards digitization. Results showed Soldiers generally feel FBCB2 is useful and worth the additional effort required to learn the systems. It also indicated that formal training in digital systems has a significant positive effect on Soldiers' attitudes and behaviors towards digital systems. The results also seem to indicate that training may help Soldiers avoid maladaptive behavior patterns that have been identified in other areas. Behaviors such as disuse or over-reliance on automated systems, a significant problem in other areas, were relatively rare for Soldiers attending formal training.

## **Technical Reports**

### **TR 1143**

#### **Phase II Final Report on an Intelligent Tutoring System for Teaching Battlefield Command Reasoning Skills**

Eric A. Domeshek. March 2004. (A421970)

This report documents Phase II efforts to develop a Socratic Intelligent Tutoring System (ITS) for Teaching Battlefield Command Reasoning Skills. The ultimate goal of this research program is to develop new ITS techniques and technology for teaching skills that cannot be taught as simple methods and procedures to be followed. Achieving expert levels of proficiency in professional-level reasoning skills—whether for battlefield commanders or for professionals in a wide range of other fields—requires extensive practice, coaching, and feedback. Students must be given a chance to drill on detailed and situation-specific knowledge, as well as high-level thinking habits and skills applicable across diverse situations. We studied exemplary coaching by observing tutoring sessions centered on Tactical Decision Games. We analyzed those sessions to identify behaviors that could be enacted and controlled by an automated Socratic tutor. We explored techniques and ultimately built an operational prototype exhibiting many of the key behaviors identified. We also built extensive tools to support authoring of the prototype's knowledge and behavior. This work has produced extensive data, analysis, and implementation, advancing our understanding of, and ability to model, professional-level Socratic tutoring.

### **TR 1144**

#### **Identifying and Validating a Model of Interpersonal Performance Dimensions**

Tara D. Carpenter, and Michelle M. Wisecarver. March 2004. (A421920)

Current models of job performance recognize its multidimensional nature but do not provide a comprehensive picture of the interpersonal requirements of jobs. As a first step toward developing a more cogent and comprehensive understanding of interpersonal performance, a taxonomy of the interpersonal requirements of jobs was developed and validated. An extensive literature review of interpersonal performance behaviors was conducted to develop a proposed taxonomy of interpersonal performance. Two studies were then completed to validate the proposed taxonomy. In the first study empirical evidence for the taxonomy was gathered using a content analysis of critical incidents taken from a job analysis. In the second study, confirmatory factor analysis was used to recreate the model based on ratings of the importance of and time spent on each interpersonal performance behavior identified in the model. Raters represented a variety of Army jobs and ranks. Confirmatory factor analyses supported the proposed taxonomy. Results also indicated that the criticality of several dimensions of interpersonal performance increased with increasing enlisted ranks. The importance of the results toward the identification of predictors of interpersonal performance is discussed.

## Technical Reports

### TR 1145

#### **Validation of Measures Designed to Maximize 21st-Century Army NCO Performance**

Deirdre J. Knapp, Rodney A. McCloy, and Tonia S. Heffner (Eds.). May 2004. (A423602)

The NCO21 research program was undertaken to help the U.S. Army plan for the impact of future demands on the noncommissioned officer (NCO) corps. The performance requirements and associated knowledges, skills, and aptitudes (KSAs) expected of future successful NCOs were used as a basis for developing tools that could be incorporated into an NCO performance management system geared to 21st-century job demands. This report documents the concurrent criterion-related validation of the predictor measures.

The predictor measures include the Armed Services Vocational Aptitude Battery (ASVAB), Assessment of Individual Motivation (AIM), and Biographical Information Questionnaire (BIQ), which are already used in the Army for other purposes. A written Situational Judgment Test (SJT), the Experience and Activities Record (ExAct), Personnel File Form (PFF21), and a semi-structured interview were developed for this project. Two types of rating scale instruments were developed for gathering criterion data. The Observed Performance Rating Scales ask supervisors to rate how well Soldiers perform in their current jobs and the Expected Future Performance Rating Scales have them predict how their Soldiers would perform in future conditions.

All of the predictors yielded one or more scores that were significantly correlated with the performance ratings. The SJT, interview, and some scores from the AIM and BIQ showed the most incremental validity over the current system. In this concurrent validation, the predictors were more highly correlated with performance at the E5 level compared to the E6 level.

### TR 1146

#### **PC-Based Training to Improve Infantry Situation Awareness**

Laura D. Strater, Justus P. Reynolds, Laurie A. Faulkner, D. Kelby Birch, John Hyatt, Scott Swetnam, Scott Metzdorf, and Mica R. Endsley. June 2004. (A425351)

It is widely recognized that Situation Awareness, SA, provides the foundation for decision making and action for Infantry warfighters. Recent research has investigated differences in SA between experienced and inexperienced officers, as well as areas of SA deficits. This Infantry Situation Awareness Training research program marks an initial effort to train Infantry warfighters in the skills necessary for developing superior battlefield SA. A two-module training program targeted at Infantry Platoon Leaders was developed. The SA Planner teaches time management and task prioritization skills, while the SA Trainer focuses more globally on developing knowledge bases and understanding the information requirements necessary to develop SA. Validation testing was conducted by giving the SA Trainer to a group of Royal Norwegian Naval cadets prior to combat fatigue exercises. Results show that trained cadets were more likely to correctly refuse to attack a civilian refugee camp than untrained cadets. In addition, trained cadets indicated that they had to spend more mental effort developing higher-order SA and determining how to best meet their goals. Even with minimal time, some training effects were found.

## Technical Reports

### TR 1147

#### **A Dialog-Based Intelligent Tutoring System for Practicing Battle Command Reasoning**

Ryder, J. M., Graesser, A. C., Le Mentec, J. C., Louwerse, M. M., Karnavat, A., Popp, E. A., and Hu, X. June 2004. (A425430)

This Phase II Small Business Innovation Research (SBIR) developed a dialog-based intelligent tutoring system (ITS) for interactive self-training of battle command reasoning. The system, called “Automated Tutoring Environment for Command” (ATEC), adapted the dialog management capability from AutoTutor (a dialog-based tutor developed by Graesser and colleagues at the University of Memphis) and integrated it with a cognitive model-based instructional agent (using CHI Systems’ iGEN cognitive agent framework). The ATEC system presents a battlefield situation and then initiates a dialog between a virtual mentor (instructional agent) and a student as they collaboratively discuss the situation. The virtual mentor poses questions, evaluates student responses, determines the sequence of questions, and ultimately assesses performance on the basis of the specificity of questioning and the depth of probing and hinting that is needed to adequately answer the questions. The results of the ATEC development effort showed some of the capabilities and limitations of tutorial dialog systems, and indicated areas for additional research and development.

### TR 1148

#### **Competency Based Future Leadership Requirements**

Jeffrey Horey, Jon J. Fallesen, Ray Morath, Brian Cronin, Robert Cassella, Will Franks, Jr., and Jason Smith. July 2004. (A426059)

The purpose of this research was to develop leadership requirements for the future Army. A competency framework that is used consistently throughout the force and that focuses on the functions of leadership will help align training, development, and performance management processes and better convey what leaders need to do. Numerous considerations were combined to generate the framework including: identification of the future of technological, geopolitical, and demographic factors; review of leadership theory; review of the evolution of Army leadership doctrine; identification of literature sources of leadership requirements; specification of the relationships leaders have with others; and comparisons of competency frameworks from the other military services. Through an iterative process, analysts developed competencies, components, and sample actions that were then reviewed by subject matter experts. A core leadership competency framework was developed that includes eight competencies and 55 components. The proposed core leadership competency framework serves to provide an analytically based description of leader requirements for the future. The incorporation of the framework into leader development processes is discussed as well as how the framework can be presented in doctrine.

## **Technical Reports**

### **TR 1149**

#### **Emotional Synthetic Forces**

Amy E. Henninger, Eric Chown , and Randy Jones. July 2004. (A426234)

Report developed under a STTR contract number DASW01-99-C-0037 entitled Emotional Synthetic Forces. The objective of this research was to make the decision-making process of complex agents less predictable and more realistic, by incorporating emotional factors that affect humans. To this end, researchers adopted an approach that promotes the emergence of behavior as a result of complex interactions between factors affecting emotions, integrated in a connectionist-style model, and factors affecting decision making, represented in a symbolic model.

This report explains the model sub-components, integration, and testing, which includes a description of the behaviors we used in the development of prototype, the design of experiments, a representative set of behavior patterns that emerged as a result of exercising the model over the design space, and recommendations for future work. Results of prototype suggest an effective means of increasing the variability of computer-generated forces (CGF) behavior in manner consistent with modern day emotional theories.

### **TR 1150**

#### **Year 1 Assessment of the Unit Focused Stability Manning**

Monte D. Smith and Joseph D. Hagman. September 2004. (A428049)

The U.S. Army Alaska's 172<sup>nd</sup> Stryker Brigade Combat Team (SBCT) is currently serving as the test unit for implementation of the newly developed Unit Focused Stability (UFS) manning system. Under UFS, combat forces are formed, trained, and deployed as intact units, with resulting stability and opportunity for accretive training serving to increase combat skills and cohesion above levels normally achieved in conventionally manned units. During the 172<sup>nd</sup> SBCT's anticipated operational cycle, the impact of UFS will be formatively assessed to determine (a) the long-term impact of personnel stabilization on unit cohesion, (b) factors/conditions that enhance or detract from this cohesion, and (c) stabilization-related lessons learned for improving future UFS implementation. Assessment methods will include the use of surveys, interviews, and focus group discussions. Results from this first year revealed robust levels of cohesion and unit climate variables in spite of widespread concerns that UFS might negatively impact senior NCO and junior officer career progression. Major recommendations for improvement of UFS implementation included: (a) proactive distribution of comprehensive UFS ground rules, and (b) mitigation of UFS' perceived negative impact on career progression. Next year's assessment efforts will focus on platoon-level measurement of personnel external (i.e., unprogrammed losses/gains) and internal (i.e., duty position changes) turbulence and determination of the relation between turbulence and unit cohesion.



## **Research Reports**

### **RR 1812**

#### **Human Performance Essential to Battle Command: Report on Four Future Combat Systems Command and Control (FCS C<sup>2</sup>) Experiments**

Carl W. Lickteig, William R. Sanders, Paula J. Durlach and James W. Lussier, and Thomas J. Carnahan. November 2003. (A419499)

The Army's ongoing transformation to Future Combat Systems (FCS) requires an unprecedented alliance of humans and machines. Creating an alliance that actually improves, and does not impede, battle command is a human systems integration challenge for FCS and particularly the area of command and control (C<sup>2</sup>). To address that challenge, the FCS C<sup>2</sup> program is investigating future battle command concepts at the small unit level. The FCS C<sup>2</sup> effort, led by Defense Advanced Research Projects Agency (DARPA) and Communications Electronics and Engineering Command (CECOM) with a focus on human performance by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), included a series of command-in-the-loop experiments from October 2001 to March 2003. This report summarizes research methods and findings on human performance across four iterative and exploratory FCS C<sup>2</sup> experiments. The human performance findings reported are based on subjective measures and highly detailed objective measures of the command group's verbal and human-computer interactions. Overall, the results provide an emerging empirical database on the C<sup>2</sup> functions and tasks required by an FCS command group in collaboration with prototype C<sup>2</sup> systems. More problematic conclusions on workload and training are followed by more promising conclusions on user-based involvement and proactive research, and particularly their potential for solving workload and training problems.

### **RR 1813**

#### **Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST) Limited User/Functional Test**

Margaret S. Salter. November 2003. (A419463)

This paper documents the technical advisory service provided by the U.S. Army Research Institute for the Behavioral and Social Sciences to the Training and Doctrine Command (TRADOC) Systems Manager Stryker/Bradley (TSM-SB) in a comparison assessment of the Bradley Conduct of Fire Trainer (COFT) and the Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST). The informal limited user/functional test collected data in two areas. The first portion of the test was designed to compare the stated capabilities of the AB-FIST as compared to those of the COFT. The second portion of the test was designed to elicit feedback from experienced users about the new device. Based on this limited test, the AB-FIST was seen to perform as well as or better than the COFT, and could be used to supplement or augment the COFT where that device is unavailable.

## Research Reports

### **RR 1814**

#### **Combat Leaders' Guide (CLG): Leader Handbook 2003**

Margaret S. Salter and James H. Centric. November 2003. (A419464)

This paper briefly documents the history of the initial Combat Leaders' Guide (CLG) project from its inception in 1985 to the 2003 reprint of the CLG. At appendix, the 2003 version of the CLG is provided. The CLG is a pocket-sized job performance aid, useful to any Soldier. Over 50,000 CLGs have been made available to Soldiers in hard copy, and it is available at the U.S. Army Research Institute web site at <http://www.ari.army.mil>.

### **RR 1815**

#### **Training Future Force Leaders to Make Decisions Using Digital Information**

Rick Archer, Walter Warwick, Patricia McDermott, and Josh Katz. December 2003. (A419668)

This report was developed under a Small Business Innovation Research (SBIR) Program, Phase I. The research sought to understand differences in decision making between traditional Infantry operations and Objective Force Warrior (OFW) operations. In OFW, digital information such as video sensors and detailed map overlays will replace probabilistic cues from the environment. The question was whether and how digital information will change the way decisions are made and information is processed. Naturalistic Decision Making methodologies were used to understand the cognitive requirements of both types of operations. While the decisions themselves do not differ, the decision-making process and the information used are different with digital information than with traditional cues. Decision making with digital information is more analytical and the OFW small unit leader must be trained to maintain coherence in order to get an accurate picture of the mission environment. There are additional steps of data analysis and data fusion because the digital information is not from the leader's own perception. Spatial orientation will become a key issue and skill in the electronic battlefield. This understanding of the decision process in the electronic battlefield was used to develop training requirements and a replicable methodology for addressing the training challenges.

### **RR 1816**

#### **MINDPRINT: Developing the Soldiers and Leaders of Objective Force and Beyond**

Holly C. Baxter, Jennifer Phillips, Jennifer Shafer, Gary Klein, and Kathleen Mosier. January 2004. (A419727)

This report was developed under the Phase I Small Business Innovation Research (SBIR) Program. Information technologies are changing the way organizations do business. In the case of the Army's Objective Force, these technologies will fundamentally transform the way in which battles are fought. They will also transform the decisions, judgments, and cognitive tasks of Soldiers and leaders. Without adequate preparation for these new cognitive requirements, the Army will be ill-equipped to use, much less capitalize on, the new technologies. The need is to (a) identify, in advance, the requirements introduced by Objective Force technologies, and

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(b) build skill and expertise around those requirements prior to implementation of the new technologies. In this research, a macrocognition framework was employed to study how Objective Force technologies will alter the cognitive landscape for small unit leaders. Data collection methods were developed to capture the macrocognitive requirements associated with the new technologies. Findings suggest that substantial changes will occur with regard to seven macrocognitive activities: the Sensemaking and Coordination functions, and the processes of Maintaining Common Ground, Developing Mental Models, Uncertainty Management, Attention Management, and Turning Leverage Points into Courses of Action. Preliminary implications for training addressing each of these macrocognitive activities are presented.

### **RR 1817**

#### **Training on Common Military Messages**

Jean L. Dyer, Adam W. Vaughn, and Paul N. Blankenbeckler. January 2004. (A419918)

The experiment examined what inexperienced Soldiers learned from a computer-based training program on four common Army messages: Spot Report, nuclear/biological/chemical, call for fire, and medical evacuation. It also examined the ability of Soldiers to complete tactical messages based on hypothetical combat scenarios and a prototype digital interface for the Land Warrior (LW) system. The message training focused on the doctrinal requirements for messages, not how to use the software interface. Soldiers ( $n = 48$ ) were from the Infantry One Station Unit Training course. The findings showed that inexperienced Soldiers have limited knowledge of common Army messages. Although the Soldiers learned from the message training, the doctrinal training per se was shown to be a necessary, but not a sufficient condition for determining appropriate message content in hypothetical tactical situations. Soldiers also need training on digital message formats and menu selections, must possess the requisite military knowledge and experience, and have the ability to understand the battlefield situation and integrate critical elements of information. Additional research is needed on the types and length of training needed to prepare Soldiers to generate appropriate military messages.

### **RR 1818**

#### **Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST): Prototype Development and Recommendations for Future Research**

Christopher R. Graves, Charles G. Heiden, Samuel N. Jenkins, Michael R. Flynn, Paul G. Smith, Steven H. Brown, and Scott B. Shadrick. January 2004. (A420036)

As the U.S. Army approaches the Future Force timeframe, challenges include developing leaders who are proficient in the conduct of dispersed operations and delivering effective training when and where training needs arise. This report describes the recently completed Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST) project. The project was sponsored by the U.S. Army Research Institute for the Behavioral and Social

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Sciences (ARI) Armored Forces Research Unit and had two primary objectives. The first was to identify selected communication requirements essential to conducting decentralized battle command in dispersed operations. The second was to develop and demonstrate a distributed approach for training those and related requirements in a multi-echelon, small group, deliberate practice setting. This report presents the project's background, objectives, activities, and outcomes. It represents the final documentation of the project and includes recommendations for the continued development of the MEDALIST training approach and the design of future Army training and simulations.

### **RR 1819**

#### **Future Combat Systems Command and Control (FCS C<sup>2</sup>) Human Functions Assessment: Interim Report - Experiment 3**

Carl W. Lickteig, William R. Sanders, Paula J. Durlach, and Thomas J. Carnahan.  
February 2004. (A420960)

The Army's ongoing transformation to Future Combat Systems (FCS) requires an unprecedented alliance of humans and machines. Creating an alliance that actually improves, and does not impede, battle command is a human systems integration challenge for FCS and particularly the area of command and control (C<sup>2</sup>). To address that challenge, the FCS C<sup>2</sup> program is investigating future battle command concepts at the small unit level. The FCS C<sup>2</sup> effort, led by Defense Advanced Research Projects Agency (DARPA) and Communications Electronics and Engineering Command (CECOM) with a focus on human performance by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), included a series of four command group-in-the-loop experiments from October 2001 to March 2003. This report provides exemplar research methods and findings on human performance from Experiment 3.

The human performance findings reported are based on subjective measures and highly detailed objective measures of the command group's verbal and human-computer interactions. Interim conclusions are provided on the following topics: workload, training, automated measures, and human-system integration. In closing, a brief set of sustain and improve recommendations are provided for future research efforts. A companion report provides a more comprehensive assessment of future command group performance across FCS C<sup>2</sup> Experiments 1-4 (Lickteig, Sanders, Durlach, Lussier, & Carnahan, In Preparation).

### **RR 1820**

#### **Assessing the Effectiveness of the Close Combat Tactical Trainer**

Thomas W. Mastaglio, Paul Peterson, and Steven Williams. January 2004. (A421746)

This report summarizes a project conducted to develop a methodology to evaluate collective training devices and apply that methodology to the Close Combat Tactical Trainer (CCTT). CCTT is a complex collective training device; there are significant cost and operational management issues in performing a controlled training transfer study or effectiveness evaluation. The study developed a qualitative method for performing qualitative effectiveness assessments and

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used it to evaluate the effectiveness of CCTT. The methodology was demonstrated to be effective. Based on analysis of feedback and perceptions acquired during data collection visits to units and fixed sites the consensus opinion of users is that CCTT is performing the mission for which it was designed. Users have embraced the technology, are enthusiastic proponents as well as eager users, and have little criticism of the simulator technology, the overall training environment, or site operations. CCTT is a critical capability that provides a step or gate in preparing for major live training events. Users do not rate the importance of training in CCTT as highly as field training. Planning for CCTT exercises and command oversight of those activities varies significantly by unit.

### **RR 1821**

#### **Novice Versus Expert Command Groups: Preliminary Findings and Training Implications for Future Combat Systems**

Thomas J. Carnahan, Carl W. Lickteig, William R. Sanders, Paula J. Durlach, and James W. Lussier. March 2004. (A421871)

The U.S. Army's ongoing transformation to Future Combat Systems (FCS) requires a commensurate transformation in training, particularly in the area of command and control (C<sup>2</sup>). This paper describes research comparing novice versus expert command group performance to identify training recommendations and implications. The research was performed by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in conjunction with the FCS C<sup>2</sup> program. Comparative results were based on objective measures of verbal and human-computer interaction (HCI) as well as subjective measures of workload, performance success, training, prototype effectiveness, and human system integration. Significant differences were identified between novice and expert command groups including lower verbalization and HCI rates by novices during enemy target identification, and higher rates of verbalization and HCI by novices in support of the destruction of enemy targets. Training examples were provided for more specific and tangible guidance to training developers and designers. Overall, the findings and training implications underscore the new training requirements for FCS, particularly embedded training, for transforming novices into experts in future command groups.

### **RR 1822**

#### **Instructional Characteristics and Motivational Features of a PC-based Game**

James Belanich, Daragh E. Sibley, and Kara L. Orvis. April 2004. (A422808)

The purpose of the research was to identify and assess instructional and motivational features of a first-person-perspective game environment. The game used was "America's Army", a popular PC-based game developed by the U.S. Army to inform "recruiting age" individuals about the Army. Twenty-one participants first completed a pre-game questionnaire that assessed prior knowledge of information presented in the game, after which they played the "basic training" sections of the game. Then, participants answered questions regarding information presented during the game and about motivational aspects of the game. Participants recalled

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procedures better than facts. Information relevant to the progression of the game was recalled better than information that was not. Graphic images and spoken text were recalled more accurately than printed text. Realism, challenge, exploration, and control were factors that influenced motivation. The findings of the current research were specific to a single PC-based first-person-perspective game, but were in agreement with a broad range of research using other types of games and instructional media.

### **RR 1823**

#### **Knowledge Networks for Future Force Training: Illustration of Searching, Retrieval, and Communication Concepts**

James A. Wall, Randle D. Elms, Keith E. Biggers, and Paul J. Sticha. June 2004. (A425353)

U.S. Army units are transforming to become a lighter, more mobile Future Force that can operate within joint and coalition environments. To enable Future Force units to achieve successful deployment, the Army is developing knowledge networks to provide access to a wide range of information across military operations. To use the vast amount of available information effectively, knowledge networks must include procedures that organize information, identify the most relevant information to meet a user request, authenticate retrieved information, and allow the user to add new information to the network. This project develops and demonstrates a prototype knowledge network that illustrates methods to retrieve information needed to facilitate mission accomplishment, and to share this information among Soldiers and units.

This research began with an information engineering activity that analyzed the functions and tasks of Future Force units to identify information requirements. The effort proceeded to develop a prototype knowledge network incorporating relevant existing technologies, including (a) Web crawlers, (b) searching and indexing, (c) rich site summary news feeds, (d) Web logs, (e) user profiling, and (f) personal messaging. The prototype was demonstrated to four Army officers and enlisted personnel, whose impressions provided feedback used to revise the prototype and to make recommendations for future system enhancements.

### **RR 1824**

#### **Assessment of the Think Like a Commander Training Program**

Scott B. Shadrick and James W. Lussier, July 2004. (A425737)

The Think Like a Commander and the Adaptive Thinking Training Method have been used to train adaptive thinking, a specific component of battlefield thinking. The training method uses cognitive battle drills to apply deliberate practice training concepts to commanders' battlefield thinking skills and allows officers to model their battlefield understandings, plans, visualizations, and decisions after expert tactician's thinking patterns. The research described in this report documents the results of the use of the Think Like a Commander training program in the Armor Captain's Career Course at Fort Knox, Kentucky, and experimentally assesses the value of the training. The analysis indicated that use of the Think Like a Commander leads to significant performance gains in a critical area of battlefield thinking: the ability to rapidly

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analyze a tactical situation in order to identify the critical information needed for decision-making.

### **RR 1825**

#### **Measuring Digital Battle Staff Proficiency in Current and Future Forces**

Bruce C. Leibrecht, Karen J. Lockaby, and Andrew M. Perrault, and Larry L. Meliza.  
July 2004. (B301959)

This report deals with the digital proficiency measurement and feedback needs of battle staffs equipped with advanced information age battle command technologies. The report begins by describing key indicators of digital staff proficiency and presenting a practical guide that leaders and trainers can use to assess how well staff elements exploit fielded digital capabilities. It next examines common deficiencies among current digitally-equipped battle staffs and how Future Force capabilities might impact the staff performance environment. The authors then consider performance measurement challenges of current and future battle staffs, exploring how measurement techniques might evolve. Finally, the report discusses feedback requirements and capabilities in current and future forces, and recommends global design features for a comprehensive After Action Review system. Altogether the findings provide tools and knowledge for building and sustaining high-proficiency battle staffs, paving the way for developing a battle-focused measurement and feedback architecture for the Future Force.

### **RR 1826**

#### **Digital Proficiency Levels for the Brigade and Battalion Battle Staff**

Bruce C. Leibrecht, Karen J. Lockaby, Andrew M. Perrault, and Larry L. Meliza.  
July 2004. (A425934)

This report results from ongoing work to develop a digital proficiency measurement architecture that includes the battle staff equipped with the Army Tactical Command and Control System (ATCCS). The report first examines primary dimensions of ATCCS-enabled performance, including major system capabilities, high-payoff user skills and tasks, and network management skills. It then explores how ATCCS exploitation contributes to critical staff functions, with an emphasis on integration across Battlefield Operating Systems (BOSs). The discussion includes findings on brigade versus battalion differences and digital versus analog staff processes. A family of proficiency level matrixes is presented for six major staff sections. Finally, the report discusses implications of the findings for digital proficiency measurement and after action review (AAR) procedures. Altogether the findings point to high-payoff proficiency targets, paving the way for ATCCS exploitation guidelines and analysis of measurement and AAR requirements for the Future Force. The report includes recommendations for harnessing the knowledge products.

**RR 1827****Warrior Ethos: Analysis Of The Concept And Initial Development Of Applications**

Gary Riccio, Randall Sullivan, Gerald Klein, Margaret Salter and Henry Kinnison.

September 2004. (A428065)

This research refines and operationalizes the 2003 definition of Warrior Ethos and examines a means for its inculcation into the Army. Specifically, the research considered Initial Entry Training (IET) of enlisted Soldiers as an initial opportunity for the application of potential solutions, although the concepts apply to officer initial military training as well.

The U.S. Army Infantry School Task Force Soldier's 2003 definition of Warrior Ethos (Mission First, Never Quit, Never Accept Defeat, Never Leave a Fallen Comrade) was examined, and further broken down into the values-based attributes exemplified by a Soldier who demonstrates Warrior Ethos. Using a theoretical framework, these attributes were linked to specific behavior, the execution of which represented an operationalization of Warrior Ethos as a complex concept. The desirable behaviors, captured in nine Warrior battle drills, were also considered from the standpoint of barriers or friction to their execution. A tentative methodology for training was then postulated.



## **Research Products**

### **RP 2004-01**

#### **Think Like a Commander—Excellence in Leadership: Educating Army Leaders with the Power Hungry Film**

Michelle L. Zbylut, and Jason N. Ward. April 2004. (A442791)

This instructor's guide is the first of two research products that describe how to use Think Like a Commander-Excellence in Leadership (TLAC-XL) in an instructional setting. This guide describes how instructors can use the film from TLAC-XL as a case study to facilitate discussion on various leadership topics, particularly those that pertain to creating effective interpersonal relationships. Instructors may find this training tool highly relevant for Captains, Lieutenants, and junior non-commissioned officers (NCOs) expected to engage in stability and support operations (SASO) in the Middle East. This guide provides an analysis and hard copy of the case study; discusses the teaching themes embedded in the case study; presents tips for promoting effective discussion; and offers lesson objectives, discussion questions and answers, and an overview of the case study as an instructional vehicle. Information about how to obtain the case study and technical requirements is included in the document.

### **RP 2004-02**

#### **Feedback to Improve Team Training (FITT) Vignette Technology for Future Command/Staff Teams**

Raymond P. Bernhagen, Bernard E. Wilson, Robert E. Wray, Bruce C. Leibrecht, and Angela I. Karrasch. April 2004. (M201823)

In support of Army Transformation, the research explored training approaches for command/staff teams in the Future Force Unit of Action (UA). This product contains the assessment and training support materials associated with the Feedback to Improve Team Training research report. This product is a library of prototype training vignettes addressing the performance requirements and operational environment of UA command/staff teams. The training vignettes are supported by streamlined guides for the training audience, coach, observers, and role players. A key element of this product is a core set of strategies and techniques for immediate, remedial and summative feedback. Also included are assessment materials for measuring team performance, team processes and feedback effectiveness. The collective products establish an innovative springboard for investigating issues, methods and tools focused on training in a Joint, Interagency, and Multinational (JIM) environment.

### **RP 2004-03**

#### **Virtual After Action Review System (DIVAARS)**

Bryan R. Clark, Donald R. Lampton,, Glenn A. Martin, and James P. Bliss. June 2004. (A425427)

This product includes the operator's manual for the Dismounted Infantry Virtual After Action Review System (DIVAARS). The 16-page manual provides complete instructions for the installation and use of the DIVAARS software. Along with the manual, a description is presented of why and how the manual was developed, including a detailed account of usability testing. Information about obtaining the DIVAARS software is included.

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DIVAARS can function as the After Action Review system for any exercise conducted with Distributed Interactive Simulation (DIS) compliant systems. Examples of DIS systems are: the Squad Synthetic Environment (SSE), Virtual Emergency Response Training System (VERTS), and the Fully Immersive Team Training (FITT) system. DIVAARS is especially useful for training small teams that operate on foot (versus from within vehicles) and in urban areas (including operations inside of buildings).

DIVAARS requires a dual Pentium III, 1.0GHz PC (or single equivalent processor, e.g., Pentium 4, 2.0GHz), 512MB RAM, 40GB drive, and a hardware-accelerated video card (e.g., nVidia GeForce 4). DIVAARS runs on Red Hat Linux (version 8.0 or 9). Other software requirements (freeware via World Wide Web) include the Virtual Environment Software Sandbox 3.0.0, Open Scene Graph 0.9.6, and OpenAL.

### **RP 2004-04**

#### **A Scenario-Generation Package For Assessing and Training Leader Skills**

Richard L. Wampler, Paul N. Blankenbeckler, & Michael D. Dlubac. July 2004. (A426014)

This report documents the development of a scenario tool set with variable factors that can be used to assess or train leader skills as the Army transitions to the Future Force. The components of the tool set can be tailored to produce 45 basic scenarios. Each scenario can be altered by injecting events to create more exercise conditions. All source documents needed for leader planning are available, to include supplemental map boards; each can be modified to conform to the desired exercise requirements. A User's Manual containing a step-by-step guide and a specific example of how to use the scenario tool set is available to assist evaluators and trainers. Use of these scenarios requires advanced planning to select the modules, components, and incidents to create the desired situation. The scenarios and resulting exercise vignettes, administered in a constructive or virtual simulation, will provide a realistic representation of expected battlefield events to allow leader skills to be assessed or trained. The scenario tool set can be used to train leader skills or research the impact on leaders of changes in organizations or technological capabilities. It can also be used for generating standardized scenarios for analysis purposes.

### **RP 2004-05**

#### **Think Like a Commander – Mission to Azerbaijan: Student Installation Disk**

Charles G. Heiden, Scott B. Shadrick, and Aaron G. Davies. September 2004. (M201768)

The Think Like a Commander and the Adaptive Thinking Training Method have been used in face-to-face instruction at the Armor Captain's Career Course at Fort Knox, Kentucky, to train adaptive thinking, a specific component of battlefield thinking. This CD-ROM contains the installation program needed to use the *Think Like a Commander – Mission to Azerbaijan* software application. The training method uses cognitive battle drills to apply deliberate practice training concepts to commanders' battlefield thinking skills and allows officers to model their battlefield understandings, plans, visualizations, and decision after expert tactician's thinking patterns. The present research product provides the material a student would require to complete

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the training. An instructor version of the material and an assessment of the training effectiveness are also available from the U.S. Army Research Institute.

### **RP 2004-06**

#### **Think Like a Commander – Mission to Azerbaijan: Instructor Materials**

U.S. Army Research Institute for the Behavioral and Social Sciences – Fort Knox, and 16<sup>th</sup> Cavalry Regiment. September 2004. (M201767)

The Think Like a Commander and the Adaptive Thinking Training Method have been used in face-to-face instruction at the Armor Captain's Career Course at Fort Knox, Kentucky, to train adaptive thinking, a specific component of battlefield thinking. The training method uses cognitive battle drills to apply deliberate practice training concepts to commanders' battlefield thinking skills and allows officers to model their battlefield understandings, plans, visualizations, and decisions after expert tactician's thinking patterns. The method was applied to distance learning and the result was the *Think Like a Commander – Mission to Azerbaijan* training tool. The present research product provides the materials an instructor would require to facilitate the training. A student version of the materials and an assessment of the training effectiveness are also available from the U.S. Army Research Institute.

## Special Reports

### **S 58**

#### **Digital Skills Training for Net-Centric Operations**

Brooke B. Schaab, J. Douglas Dressel, and Franklin L. Moses. January 2004. (A421861)

Multiple research activities identified training methods that enhance Army net-centric operations where Soldiers use sophisticated digital systems that interact over an electronic network. Researchers collected information from Soldiers over five years, from 1999 to 2003, to understand how “going digital” changes responsibilities and training needs. Soldiers documented training preferences and shared frustrations and successes as their understanding and expertise evolved over time. This special report presents principles and recommendations, including supporting evidence from extensive experimentation and field surveys, for training Soldiers to maximize their use of digital systems. Results should help Soldiers to increase the speed and the ease of transformation to net-centric operations.

### **S 59**

#### **Virtual Environments for Infantry Soldiers**

Charlotte H. Campbell, Bruce W. Knerr, and Donald R. Lampton. May 2004. (A425082)

Environments for Dismounted Soldier Simulation, Training and Mission Rehearsal. The four-year (Fiscal Year [FY] 99-FY 02) STO effort was proposed to address a range of U.S. Army future operational capabilities described in U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 525-66 (U.S. Army Training and Doctrine Command, 1997). The STO activities and goals were focused on overcoming critical technological challenges that prevented effective Infantry Soldier simulation. The U. S. Army Research Institute for the Behavioral and Social Sciences (ARI) led a team of both government and industry developers in examining simulation capabilities for Infantry. The other government partners were the U.S. Army Simulation, Training, and Instrumentation Command (STRICOM) and the U.S. Army Research Laboratory Human Research and Engineering Directorate (ARL-HRED) and Computational and Information Sciences Directorate (ARL-CISD). Each of the major players had a particular area of interest, but all worked together to explore concepts and systems and to recommend directions for further work on training, concept development, and mission rehearsal. The overall goal for the STO was to develop a demonstration Infantry leader trainer at the fire team, squad, and platoon level. The envisioned system would include a variety of capabilities: for leader trainees to execute a series of realistic training scenarios (combat operations and support operations) in the simulator; for subordinates, other friendly forces, enemy forces, and civilians to be represented by computer-controlled or semi-automated agents; and for repeated practice, enhanced by training features, coaching, and AARs, that would build decision-making and coordination skills.

### **S 60**

#### **Fiscal Year 2004 Program**

U.S. Army Research Institute for the Behavioral and Social Sciences. February 2004. (A429941)

The mission of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize individual and unit performance and readiness to meet the Army

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operational requirements through advances in the behavioral and social sciences. The purpose of this document is to describe the work that ARI will accomplish in its Fiscal Year 2004 program.

## Study Reports

### **SR 2004-01**

#### **Applying a Multi-Skilled Soldier (MSS) Concept to the Stryker Brigade Combat Team (SBCT)**

John T. Nelson II, and Marcia C. Chirico. November 2003. (A429930)

The general purpose of this study was to deepen and broaden thinking about the nature and implications of possible Multi-Skilled Soldier (MSS) Concept implementation. Specific objectives were (1) to determine applicability of the MSS to the Stryker Brigade Combat Team (SBCT), as it might be implemented in Initial Entry Training (IET) and (2) to prototype MSS Concept implementation for the SBCT, considering possible implementation for the Future Force. The report also defines the MSS; shows how the MSS Concept might fit conceptually within a larger Army training, education, and professional development model for Soldiers of all ranks; offers an MSS Program design for IET; and crafts actionable recommendations regarding general MSS implementation for IET. The study concludes that the MSS Concept is fully applicable to the SBCT, as well as the so-called Current Force. It also concludes that MSS implementation would have a significant salutary effect on unit training readiness postures across the force. This study relied heavily on insights and analysis gained from interviews with groups of senior NCOs and officers within the 3<sup>rd</sup> Brigade (SBCT), 2<sup>nd</sup> Infantry Division, Ft. Lewis, WA, during September 2002.

### **SR 2004-02**

#### **Basic Officer Leader Course (BOLC): Recommendations on the Phase II Program of Instruction, Cadre Selection, and Cadre Train-up**

Margaret S. Salter, James H. Centric, and Richard L. Wampler. June 2004. (B295074)

This paper provides overall recommendations on three aspects of the Phase II Basic Officer Leader Course (BOLC), as it was conducted at Fort Benning, GA during 2001-2003. BOLC Phase II is part of the newly designed three-phased officer-training program. After pre-commissioning, Phase I, lieutenants report to a common site for a standardized program of instruction heavily focused on leadership, counseling and field craft in a hands-on field environment (Phase II). After completion of BOLC Phase II, lieutenants attend Phase III of their training (traditional officer basic course), to learn their branch specific skills. After assessment of the four Pilot programs, ARI makes recommendations of the final Program of Instruction, cadre selection and cadre train-up. Properly resourced, BOLC can be a powerful tool in preparing officers to become confident and competent small unit leaders.

### **SR 2004-03**

#### **Linguist Training and Performance**

Jerry M. Childs. February 2004. (A420932)

This study examined the effectiveness of training programs delivered by the Defense Language Institute Foreign Language Center (DLIFLC) and Advanced Individual Training (AIT).

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Data were gathered from linguists assigned to AIT or units, using Web-based questionnaires. DLIFLC graduates (n = 100), bypass linguists (n = 26) and their AIT instructors (n = 12), unit linguists (n = 11), and unit supervisors (n = 3) provided Likert ratings and narrative comments to address eight major areas of interest. Results indicate that linguists feel that DLIFLC and AIT are adequately preparing them for their jobs, that minor curriculum modifications can yield more effective DLIFLC and AIT programs, and that bypass linguist responses were similar to those of DLIFLC graduates. Linguists prefer learning by interacting with instructors and peers rather than using technology-based instruction such as with distance learning.

### **SR 2004-04**

#### **Replication of Zeidner, Johnson, and Colleagues' Method for Estimating Army Aptitude Area (AA) Composites**

Tirso Diaz, Michael Ingerick, & Mary Ann Lightfoot. April 2004. (A426299)

To select and classify recruits to entry-level jobs, the Army employs nine Aptitude Area (AA) composites that are derived from the Armed Services Vocational Aptitude Battery (ASVAB). Effective January 2002, the Army adopted an “interim” set of nine AA composites based on empirically estimated weights for a seven ASVAB test battery. Zeidner, Johnson, and colleagues had developed these “interim” composites as part of ongoing research into improved military classification systems. The purpose of the present study was to independently replicate and document – as a prerequisite for subsequent evaluation – the Zeidner, Johnson, and colleagues’ method, and previously reported results, for the 9, 17, and 150 composites comprising their proposed classification system. Following Zeidner, Johnson, and colleagues’ method, the present study successfully reproduced the 9, 17, and 150 composites. These findings support the operational use of the 9 “interim” composites, as well as the use of the 9/17/150 composites in future research and policy analysis evaluating the potential of the proposed two-tiered classification system to substantially improve Army-wide classification and assignment.

### **SR 2004-05**

#### **Estimating Academic Attrition from Technical Training School Data: Method and Simulation Results**

Tirso Diaz, Michael Ingerick, Robert Fowler, and Mary Ann Lightfoot. August 2004. (A426300)

This study proposes a logistic regression-based approach for estimating academic attrition from technical training school data. The proposed approach enables Army personnel managers to evaluate tradeoffs when making decisions about where to set minimum enlistment standards. A large-scale simulation was conducted based on actual training school data from a selected MOS to evaluate the approach and to assess sampling error of estimated attrition rates under different sample sizes and operational scenarios. Major findings indicate that: (a) a simple approach based on the logistic regression using only cognitive aptitude information is adequate for evaluating impact of

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changes in minimum enlistment standards on academic attrition for MOS with medium validity or greater; (b) a large enough sample size allows smaller changes in minimum enlistment standards to achieve a targeted attrition rate with confidence; and (c) personnel and training decisions could be greatly improved by extending the current model to incorporate information in addition to cognitive aptitude. The report includes a ready-to-use statistical program for applying the proposed approach to actual training school data for the purposes of making operational decisions.



## Study Notes

### **SN 2004-01**

#### **Identifying and Assessing Interaction Knowledges, Skills, and Attributes for Objective Force Soldiers**

Tim Bowden, Lila Laux, Patricia Keenan, and Deirdre Knapp. October 2003. (A418015)

The future force has defined the U.S. Army as it is expected to exist within the next 30 years (U.S. Army, 2001). The future force will be supported by Future Combat Systems (FCSs) that will improve the speed, maneuverability, fighting capacity, and survivability of the Army's combat operations. Transformation to the future force obviously requires tremendous advances in technology to provide the FCSs that will enable the future force. Just as importantly, however, the Army recognizes the importance of its Soldiers in accomplishing the transformation, both in terms of making the transition and working effectively within the new systems. This transition will require future force Soldiers to possess unprecedented interpersonal skills in order to achieve success in their new unit structures. The goal of this Small Business Innovation Research Program (SBIR) Phase I effort was to identify the interpersonal knowledges, skills and attributes (KSAs) required of the future force Soldiers and identify innovative strategies for measuring those KSAs in future Soldiers.

### **SN 2004-02**

#### **Principles for Defining Multi-Skilled Jobs Based on Mission Requirements for Multi-Functional Units: The Multi-Skilled Soldier Job Modeler (MJM)**

Allan Akman, and John T. Nelsen II. October 2003. (A418185)

This report discusses principles for identifying and categorizing jobs requiring Multi-Skilled Soldiers (MSS). These principles provide insight to key questions that the Army must answer in developing MSS, including how to define MSS, what operational and organizational objectives are trying to be achieved, how MSS will impact Military Occupational Specialty (MOS) restructuring, among others. This process of identifying job requirements is an important element in the MSS Developmental Blueprint which can be used to define and assess potential MSS implementation and sustainment courses of action. This paper describes concepts for defining unit functional requirements, MSS job requirements, and methods to derive the latter from the former. These are organized into the MSS Job Modeler (MJM). MJM included explicit definitions of unit functional requirements and MSS job requirements. Basic principles for job and task analysis as well as principles attributable to developing MSS are identified. The MSS principles include: defining MSS jobs in terms of tasks, knowledge, skills, and abilities; developing MSS to enhance unit deployability, sustainability, lethality, mobility, and survivability; modifying existing job structures to reflect combined arms units, assessing MSS feasibility in terms of mental and physical workload, and addressing Army wide job structure issues.

## Study Notes

### **SN 2004-03**

#### **Understanding and Improving the Assessment of Individual Motivation (AIM) in the Army's GED Plus Program**

Deirdre J. Knapp, Eric D. Heggstad, and Mark C. Young (Editors). January 2004. (A420227)

The Assessment of Individual Motivation (AIM) test was developed by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to assess work-related temperament characteristics. In February 2000, the Army implemented AIM as a new market-expansion enlistment screening tool under the "GED Plus" program. Under this program, non-high school diploma graduates who might otherwise be ineligible for military service can enlist if they score sufficiently high on the AIM and meet other program requirements. This project addressed several operational issues pertaining to AIM's ongoing use in the GED Plus program. Post-implementation investigations have included (a) a preliminary examination of the operational AIM's validity against attrition under the GED Plus program, (b) the scaling of AIM alternate forms, (c) an examination of variables that might be used to supplement AIM in the prediction of first-term attrition, (d) fairness analyses, and (e) efforts to develop improved ways to score the AIM.

### **SN 2004-04**

#### **Fairness of Army ASVAB Test Composites for MOS and Job Families**

Joseph Zeidner, Cecil Johnson, Yefim Vladimirovsky, and Susan Weldon. April 2004. (A422165)

Major goals of this research are to evaluate the fairness to minorities of the new operational ASVAB seven test composites and to compare the seven test composites with the previously utilized nine test composites.

The experiment evaluates fairness in predicting performance outcomes as measured by the actual SQT (Skill Qualification Test) scores of individuals assigned to MOS by the operational system. Fairness is measured by the difference between predicted performance and SQT scores across gender and race. Complete fairness is indicated by very small mean difference and fairness to minorities is present when mean difference in the minority group is zero or has a positive sign (overprediction). The sample uses ARI's data set of ASVAB scores limited to 66 MOS and SQT scores obtained during FY 1987-1989. The total sample size of first-term enlistees was 83,132.

Findings indicate that the proposed new seven least squares estimate (LSE) test composites are comparatively fair to minorities. The results using seven test composites are comparable to the previous study using nine test composites.

## Study Notes

### **SN 2004-05**

#### **Update of U.S. Army Research Institute's Officer Personnel Research Data Bases for 2001 and 2002**

Winnie Y. Young. June 2004. (A425354)

This document describes the procedures performed to add 2001 and 2002 personnel data to the Longitudinal and Core data sets of the U.S. Army Research Institute's Officer Longitudinal Research Data Base (OLRDB) and to the Core Data Set of the Officer Standardized Educational Testing Data Base (OSETDB). These data sets were designed for research purposes and contain historical and current data on U. S. Army commissioned officer personnel. The OLRDB contains career history data primarily from the 1979 through 2002 Officer Master Files (OMF) and the Separation Officer Master Files (SOMF). The OSETDB contains academic measures for officer personnel commissioned between 1980 and 1990. In particular, the testing data includes Scholastic Aptitude Test (SAT) scores from the Educational Testing Service and American College Test (ACT) scores from the American College Testing Program for academic years 1973 through 1985.

### **SN 2004-06**

#### **Comparison of Alternative Methods of Measuring ASVAB Test Composite Fairness**

Joseph Zeidner, Cecil Johnson, Yefim Vladimirovsky, and Susan Weldon. July 2004. (A425433)

The major objective of the present research is to compare the fairness measures obtained by the prediction error (PE) model with the Cleary model for female and black Soldiers utilizing the current Army aptitude area composites as predictors and Skill Qualifications Test (SQT) scores as the criteria. Fairness is traditionally defined as the absence of underpredictions for the minority groups that are considered potentially susceptible to discrimination. The Cleary model was chosen for comparison with the PE model because Cleary has been considered the "gold standard" of fairness measurement for more than three decades.

The models are compared for selection and classification and evaluated by a common metric using the same robust Army database in a double cross-validation design permitting objective estimates of prediction fairness.

The authors conclude that the results obtained for the PE and Cleary models are quite comparable for practical purposes for selection, but possibly not for classification. They find that the PE model is the better of the two because of the precision that comes with utilization and reliance upon individual test scores.

## Study Notes

### **SN 2004-07**

#### **Examining the Impact of ASVAB Renorming Upon Selection and Classification in the Army**

Peter M. Greenston. July 2004. (A429938)

DOD will implement new norms for the Armed Services Vocational Aptitude Battery (ASVAB) in July 2004. These norms will reflect the 1997 Youth Population, replacing the 1980 Youth Population norms currently in effect. The purpose of this Study Note is to document the descriptive analyses undertaken to examine the impact of the new norms upon selection and classification in the Army (Regular, Reserve, and Guard). The analyses were conducted with 2002 – 2003 test data denominated in both 1980 and 1997 scale scores. Under the new norms and existing Army selection standards, and in the absence of newly focused recruiting effort, we would expect some decline in the proportions of Test Score Category (TSC) 1-3A and 3B applicants, and some increase in TSC 4. This holds for all three components. Greater effects are projected for racial-ethnic minorities, and for females to a lesser extent. With regard to classification, small adjustments to cutoff levels for Aptitude Area (AA) scores are recommended to maintain existing percentage qualification rates for Army MOS.

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### **RN 2004-01**

#### **U.S. Army Research Institute Program in Basic Research 2002 – 2003**

U.S. Army Research Institute for the Behavioral and Social Sciences – Research and Advanced Concepts Office. November 2003. (A418333)

This document contains detailed summaries for each of the U.S. Army Research Institute's basic research contracts for the fiscal years 1998 - 2003. These summaries are grouped according to three Basic Research Office program objectives: Providing fundamental knowledge to improve training in complex, digital environments; providing fundamental knowledge to improve leader assessment and accelerate leader development; and providing fundamental knowledge for identifying and measuring the attributes and skills that are critical to soldier recruiting, performance, and retention in the transforming Army. In addition to summarizing what was done or is being done, each summary also describes the contributions of that research effort to basic behavioral science and suggests how the findings might benefit the Army and other military services.

### **RN 2004-02**

#### **Social and Cultural Dynamics of American Military Organization**

David R. Segal. January 2004. (A419659)

This report reviews a program on military organization conducted during the last five years of the twentieth century. The collapse of the Soviet Union and the Warsaw Treaty alliance and the involvement of the American Military in operations other than war in coalition with other nations, defined the international context of this period. A full-employment economy and increasing levels of college attendance among American youth characterized the domestic environment. The research program focuses on six areas. 1) Attitudes and behavior of youth, including patterns, trends, and correlates of enlistment propensity and the relationship between propensity and enlistment. 2) Adaptation of soldiers to the military and to participation in peacekeeping operations. 3) Military families, including family adaptation to separation during deployment, communication between forward deployed soldiers and the home front, and family adaptation to disaster. 4) Gender diversity, including gender integration, sexual harassment, and the effect of gender on enlistment propensity. 5) Comparative research, including national differences in organizational adaptation to the end of the Cold War in Europe. 6) The intersection of the military and American society, including the impact of service on the civilian adaptation of veterans, and the economic impact of military bases on their host civilian communities

### **RN 2004-03**

#### **International Military Education and Multinational Military Cooperation**

Charles Moskos. January 2004. (A419747)

The core thesis is that American military officers can play a key role in countering incipient and overt perceptions of American arrogance. This report is based on interviews with international officers (IOs) at American war, command and staff colleges in each of the services

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who participate in International Military and Education and Training (IMET). Overall, the level of multinational cooperation is remarkable. At the IMET level, recommendations include: (1) make medical insurance available for family members of all foreign officers; (2) decrease the classified material unavailable to IOs because of security classifications; (3) add more curriculum content on multinational operations; (4) be alert to the unique status of Arab IOs; and (5) make more effort to incorporate the spouses of IOs into the American social scene. Regarding multinational headquarters, recommendations include: (1) some use of non-English phrases in social interaction with IOs; (2) avoid speaking too quickly or using acronyms that are not familiar; (3) be alert to the stereotype of Americans as having a “zero-defects” or “check-point” mentality and an obsession with work; (4) encourage more cross-national informal activities; (5) read something about the home country of a fellow IO; and (6) rethink the career paths of Foreign Area Officers.

### **RN 2004-04**

#### **Personnel Stabilization and Cohesion: A Summary of Key Literature Findings**

Monte D. Smith, and Joseph D. Hagman. March 2004. (A421760)

Reviewed U.S. military-related research to (a) determine the effects of personnel stabilization on unit cohesion, and (b) identify conditions/factors found to either mitigate these effects or benefit from them. Consistent support was found for the sequential linkage of Personnel Stability → Bonding → Cohesion → Desirable Outcomes. Personnel stability promotes bonding processes that set the stage for the development of horizontal (soldier to soldier), vertical (soldier to leader and vice versa), and organizational (soldier/leader to the Army) cohesion. Cohesive units, in turn, consistently demonstrate enhanced performance across a broad array of outcome measures. Questions remain, however, concerning conditions/factors that promote, or inhibit, the development of unit cohesion and what the pattern of cohesion development looks like over time. Lessons learned from this review will be used to guide a long-term impact assessment of enhanced personnel stabilization resulting from implementation of the Army’s newly developed Unit Focused Stabilization Manning System within the U.S. Army, Alaska’s (USARAK’s) 172<sup>nd</sup> Stryker Brigade Combat Team.

### **RN 2004-05**

#### **Promoting Realistic Self-Assessment as the Basis for Effective Leader Self-Development**

Jose Cortina, Steve Zaccaro, Lynn McFarland, Kate Baughman, Gabrielle Wood, and Eric Odin. April 2004. (B298034)

The overall objective of the proposed research effort was to design a leader development support program that grows self-regulation skills needed in successful self-development as well as other leader-relevant skills and targets distortion in self appraisals. The program includes assessment tools that measure attributes promoting a motivational orientation toward self-development, and the skills needed to successfully engage in self-development activities. Tools were examined that are resistant to self-enhancement biases and response distortions that can

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impede realistic self-appraisals. Prototypical conditional reasoning and biodata items of selected attributes were developed to compare their utility and validity to more traditional measures in a follow-on effort. Finally, a template was designed for a computer-based program that can foster leader self-development through modules tailored to the abilities and dispositions of the trainee.

### **RN 2004-06**

#### **FY 2003 GPRA Performance Report**

U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). March 2004.  
(B299158)

The FY 2003 Performance Report has been prepared in response to the Government Performance and Results Act (GPRA) of 1993, Public Law 103-62. It is ARI's eighth annual GPRA performance report, providing feedback to ARI employees, managers, and the public as to how well ARI met the goals set forth in its FY 2003 Performance Plan. The performance data are also being used to reassess programs, establish FY 2004 goals, and continuously improve organizational practices related to performance planning and accountability.

### **RN 2004-07**

#### **List of U.S. Army Research Institute Research and Technical Publications**

U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). May 2004.  
(A424163)

The means of dissemination of the results of ARI's research and development/studies and analysis program vary widely depending on the type of work, the subject matter, and the sponsor/proponent. Typically, major findings with immediate policy and procedural implications are briefed to sponsors and proponents in order to enable timely implementation. This is followed up with complete documentation in the form of research and technical publications such as the ones listed here. In many cases, these documents represent the actual item handed off to the sponsor/proponent; this is particularly true of the Research Product category. In other cases, results are published in order to provide a complete record of the work done, and for future reference by researchers doing work in the same or similar areas.

This annotated list for FY03 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.

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### **RN 2004-08**

#### **Development of Recruiter Assessment Measures for the U.S. Army**

Walter C. Borman, Kristen E. Horgen, Scott A. Birkeland, Lisa M. Penney, Martha J. Sutton, Lisa J. Mills, Leonard A., White, and Stephen Bowles. July 2004. (A425937)

This report describes the important performance requirements of the Army recruiter job and provides a review of assessment and training practices in the current Army Recruiter Course (ARC), as well as applicable practices in the private sector. It reviews several areas of strength and opportunities for improvement in the ARC. In addition, the report describes how a research foundation for an integrated ARC assessment system may be developed at the Recruiting and Retention School. Finally, three products were developed to assist USAREC in their efforts to develop tools for the training and development of recruiters, the Army Recruiter Performance Rating Scales, a Situational Judgment Test (SJT), and a recruiter in-basket simulation exercise.

### **RN 2004-09 Canceled**

### **RN 2004-10**

#### **Development of a Conditional Reasoning Measure of Team Orientation**

Patrick Gavan O'Shea , James E. Driskell, Gerald F. Goodwin, Michelle L. Zbylut , and Stephanie M. Weiss. September 2004. (A427947)

This paper describes a two-year effort to develop a measure of personality-based team orientation using conditional reasoning (CR). A model of team orientation is proposed and the conditional reasoning testing methodology is reviewed. This paper recounts the test development and validation efforts surrounding two CR tests. Although validation efforts indicated that the tests did not achieve acceptable validity and reliability coefficients, individuals who wish to construct CR tests may find the section of "lessons learned" to be particularly helpful.



## **Contractor Reports**

Additional reports submitted by contractors which are not listed in the previous categories.

### **CR 2004-01**

#### **Development of Officer Leadership for the Army: Preliminary Results**

Bruce J. Avolio, and Francis J. Yammarino. October 2003. (A418016)

Two field experiments were designed to test some of the main propositions in transformational leadership theory. The main purpose for conducting these experiments was to develop a better understanding of how to accelerate the development of Army Officer leadership. It was done systematically to create specific leadership constructs that examined how they affected individual/group development, readiness, and performance over time. The results show a successful pilot project where officers in the experimental and control condition differed in learning ideas about leadership, while remaining similar in other ways from those not receiving transformational leadership training.

### **CR 2004-02**

#### **Working Memory Influences on Long-Term Memory and Comprehension**

Gabriel A. Radvansky. January 2004. (A419467)

This project was conducted with the aim of understanding the role of working memory in the comprehension and long-term retention of event-specific information. This study looked at how comprehension and memory processing at the mental model level is related to traditional measures of working memory capacity, including the word span, reading span, operation span, and spatial span tests. Issues of particular interest were the ability to remember event descriptions, the detection and memory of functional relations, the detection of inconsistencies, sensitivity to causal connectivity, and memory for surface form, textbase and situation-specific content. Although traditional working memory span measures were related to a few of our tests, the relation was primarily confined to the textbase level of processing. There was little evidence that traditional measures of working memory span were directly related to processing at the mental model level.

### **CR 2004-03**

#### **Perspectives On Studying Collaboration In Distributed Networks**

Karol G. Ross. January 2004. (A419565)

This report describes cognitive variables and frameworks that are useful in the investigation of network collaboration in Army environments. Network collaboration is currently under study by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in the context of performance in a simulated network task using the game SCUDHunt. SCUDHunt was developed by ThoughtLink, Incorporated for the Defense Advanced Research Projects Agency (DARPA). The use of SCUDHunt does not constitute endorsement of the product by ARI, the U.S. Army or the U.S. Department of Defense. Key variables that facilitate functioning in this simulated network environment are discussed, based on the results of interviews with proficient SCUDHunt players. Frameworks for examining the data from the SCUDHunt studies are presented. Finally, brief recommendations for the directions of future research in this domain are presented.

## **Contractor Reports**

### **CR 2004-04**

#### **Situational Awareness – Simulation Training and Assessment Toolset**

Mark L. Heinrich , Michael T. Gately, and Donald R. Lampton. April 2004. (B297711)

Members of small dismounted infantry units will face growing responsibilities and increasing challenges in combined arms combat and in contingency operations on the battlefield of the future. Many of these missions will take place in urban settings. Training for Military Operations in Urban Terrain (MOUT) is limited by time, cost, and safety factors. Virtual environment technologies have the potential to provide the Army with a training capability to meet these new demands. Critical to the success of these teams is a high level of situational awareness (SA) – both by individuals and as a team. Results of the Phase I SBIR for “Situational Awareness – Simulation Training and Assessment Toolset” (SA-STAT) are described. The main product of the research is a system architecture that leverages existing virtual environment infrastructure, automates the collection of data for currently used SA measurement methodologies, and incorporates several new SA measurement technologies. New SA measurement technologies include level of soldier arousal based upon physiological measurements, soldier behavior/decision-making/performance, a continuous SA Rating for individuals and the team, and a dynamic After-Action Review. A Scenario Authoring Methodology and Tool was also designed.

### **CR 2004-05**

#### **Dismounted Infantry Situational Awareness Tool**

Tim Langevin, and Peter Stammers. April 2004. (B297705)

Dismounted Infantry training systems which make use of Distributed Simulation networks in Virtual Environments enable After Action Review of exercises such that “what” happened during an exercise can be reviewed by the trainees. The ability to determine “why” events happened and “how to improve” team and team leader performance can only be understood if more abstract, derived data representing the Situational Awareness (SA) of the team and team leader during an exercise is captured and reviewed. Current SA techniques disrupt the continuity of exercises. The Army requires new tools and techniques such that trainees and researchers can capture SA data during an exercise, but review it and analyze it later using powerful AAR and analytical tools. MÄK Technologies and FATS, Inc. performed the research needed to develop such a Situational Awareness for Dismounted Infantry system. This report describes market research and literature reviews used to determine the functionality and metrics needed for SA for DI. It also identifies an analytical product to use as the basis for an SA data analysis tool, which will allow us to develop this system and test it within an operational dismounted infantry training environment.

## **Contractor Reports**

### **CR 2004-06**

#### **AutoCAS (Automated Communications Analysis System): for use in Military Synthetic Environment Exercises**

Michael P. Linegang, Jared Freeman, Gilbert Mizrahi, Elliot Entin, Keith Baker, David D. Lewis, Michael Waite, and Kelly Leighton. April 2004. (B298003)

Effective communications are essential in military operations in urban terrain (MOUT). Leaders must coordinate distributed squads of Soldiers in hostile, urban battlegrounds through communication. However, though verbal communications are easy to capture, it traditionally takes days or weeks to analyze and assess these valuable data. Thus, communications analysis has become the province of research. Communications data are rarely available for use in assessment and training of Soldiers.

The AutoCAS vision is a system that automates communications analysis through a combination team performance science, voice recognition technology, and automated text classification techniques to provide training and assessment feedback for use in AAR settings to improve the communication performance of teams of MOUT dismounted Soldiers. In our Phase I work, we tested new science and technology that dramatically accelerates communications analyses, making it possible to debrief communications within minutes of the completion of a MOUT training scenario. Here we describe the development of a communications measurement scheme, assessment of voice recognition technologies and automated text classification technologies to support the automation of this scheme, and an initial system design for AutoCAS. Phase II will develop a functional prototype of AutoCAS culminating with a demonstration of AutoCAS in an infantry MOUT training exercise.

### **CR 2004-07**

#### **New Measures of Situation Awareness for VE-based Training of Small Infantry Squads**

Jennifer M. Riley, David B. Kaber, and Mica R. Endsley. April 2004. (B297990)

This report documents research on the development of concepts for a new measure of situation awareness (SA) to be used in virtual training exercises for assessing land warrior readiness for battle operations. Situation awareness measurement techniques were critically evaluated to assess the utility of the methods for adaptation to current ARI training systems and technologies. The measures were also reviewed to assess their adequacy for assessing levels of perceptual knowledge and infantry soldier ability to make comprehensions and projections on various elements influential on SA in battle situations. Query methods (e.g., freeze queries and real-time probes) of SA measurement were identified as the most compatible direct, objective measure of SA for application in the ARI training setup. Observer/expert ratings and self-rating were identified as superior subjective measures of SA for use with ARI virtual reality systems. Real-time probes and expert ratings of SA behaviors were adapted and integrated, along with assessments of team communications, to develop a new comprehensive measure of SA in virtual MOUT training. A computer-based method for assisting the delivery of probes was devised.

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Methods for integrating qualitative and quantitative results of the various SA measurements and providing online and after action feedback to trainees were also developed.

### **CR 2004-08**

#### **Enlistment Propensities of University Students**

Charles Moskos. October 2003 (A426874)

The core thesis is that American military officers can play a key role in countering incipient and overt perceptions of American arrogance. This report is based on interviews with international officers (IOs) at American war, command and staff colleges in each of the services who participate in International Military and Education and Training (IMET). Overall, the level of multinational cooperation is remarkable. At the IMET level, recommendations include: (1) make medical insurance available for family members of all foreign officers; (2) decrease the classified material unavailable to IOs because of security classifications; (3) add more curriculum content on multinational operations; (4) be alert to the unique status of Arab IOs; and (5) make more effort to incorporate the spouses of IOs into the American social scene. Regarding multinational headquarters, recommendations include: (1) some use of non-English phrases in social interaction with IOs; (2) avoid speaking too quickly or using acronyms that are not familiar; (3) be alert to the stereotype of Americans as having a “zero-defects” or “check-point” mentality and an obsession with work; (4) encourage more cross-national informal activities; (5) read something about the home country of a fellow IO; and (6) rethink the career paths of Foreign Area Officers.

## Index of ARI Publications

### Abbreviations

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TR	Technical Report	SR	Study Report
RR	Research Report	SN	Study Note
RP	Research Product	RN	Research Note
S	Special Report	CR	Contractor Report

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Update of U.S. Army Research Institute's Officer Personnel Research Data Bases for 2001 and 2002 SN 2004-05

U.S. Army Research Institute Program in Basic Research 2002 – 2003 RN 2004-01

Validation of Measures Designed to Maximize 21st-Century Army NCO Performance TR 1145

Virtual After Action Review System (DIVAARS) RP 2004-03

Virtual Environments for Infantry Soldiers S 59

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RR 1827

Working Memory Influences on Long-Term Memory and Comprehension CR 2004-02

Year 1 Assessment of the Unit Focused Stability Manning TR 1150



**List of ARI Books and Book Chapters,  
Conference Papers, Poster Presentations,  
and Refereed Journal Articles  
FY 2004**

### **FY 2004 Books and Book Chapters**

- Day, D. V., Zaccaro, S. J., & Halpin, S. M. (Eds.) (2004). *Leader Development for Transforming Organizations*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Dyer, J.L. (2004). The measurement of individual and unit expertise. In J. W. Ness, V. Tepe, & D. R. Ritzer (Eds.) *The science and simulation of human performance* (pp. 11-124). San Diego, CA: Elsevier.
- Cianciolo, A. T., Matthew, C., Wagner, R. K., & Sternberg, R. J. (2004). Tacit knowledge, practical intelligence, and expertise. In N. Charness, K., A. Ericsson, P. Feltovich, & R. Hoffman (Eds.), *Cambridge Handbook of Expertise and Expert Performance*.
- Fallesen, J. J. & Halpin, S. M. 2004. Representing cognition as an intent-driven process. In J. W. Ness, V. Tepe, and D. R. Ritzer (Eds.). *The science and simulation of human performance* (pp. 195-266). Oxford, UK: Elsevier Ltd.
- Legree, P. J., Psotka, J., Tremble, T., & Bourne, D. (2004). Using consensus based measurement to assess emotional intelligence. In R. Schulze & R. D. Roberts, *International Handbook of Emotional Intelligence* (pp. 99-123). Berlin, Germany: Hogrefe & Huber.
- Payne, S. C., Finch, J. F., & Tremble, T. R. Jr. (2003, July). Validity surrogate measures of psychological constructs: The application of construct equivalence to archival data. *Organizational Research Methods*, 6(3), 363-382.

### **FY 2004 Conference Papers**

- Barnett, J. & Meliza, L.L. (2003, December). *Automation Integration: Comparing Flightdeck Automation and U.S. Army Digitization*. Paper presented at the 2003 Interservice/ Industry Training Simulation, and Education (I/ITSEC) Conference, Orlando, FL.
- Barnett, J.S. (2004) *Training people to use automation: Strategies and methods*. Proceedings of the International Conference on Education and Information Systems, Technologies and Applications (EISTA 2004). Orlando, FL: International Institute for Informatics and Systemics.
- Barnett, J.S. (2004, March). Human performance challenges in combat aviation. In J. Kring (Chair) *Human performance in extreme environments: From the battlefield to the final frontier*. Panel discussion at the Human Performance, Situation Awareness, and Automation Technology Conference, 22-25 March 2004, Daytona Beach, FL.



- Barnett, J.S. & Meliza, L.L. (2004, May). *After Action Review Challenges with Networked Command and Control systems*. Presentation at the department of Defense Human Factors Engineering Technical Advisory Group meeting (TAG-51), Atlantic City, NJ, May 10-13, 2004.
- Belanich, J., Orvis, K.L., & Sibley, D. (2003, November). *The effective use of computer games for training*. Paper presented at the E-Learn Conference, Association for the Advancement of Computing in Education, Phoenix, AZ.
- Belanich, J., Orvis, K.L. & Mullin, L. (2004, August). *Instructional characteristics and motivational features of a PC-based game*. Paper presented at the 20th Annual Conference on Distance Teaching & Learning, Madison, WI.
- Borman, W. C., White, L. A., Bowles, S., Horgen, K. E., Kubisiak, U. C., & Penney, L. M. (2003, November). *U. S. Army recruiter selection research: An update*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Chernyshenko, O. S., Stark, S. E., & Drasgow, F. (2003, November). *Predicting attrition of Army recruits using optimal appropriateness measurement*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Durlach, P.J. (2003, December) *Visual Change Detection in Digital Military Displays*. Paper presented at the 2003 Interservice/Industry Training Systems and Education (I/ITSEC) Conference, Orlando, FL.
- Durlach, P.J. and Meliza, L.L. (2004, May). *The need for intelligent change alerting in complex monitoring and control systems. Interaction between humans and autonomous systems over extended operation*. AAAI Technical Report SS-04-03. 93-97. Paper was presented at the AAAI Spring Symposium, Palo Alto, CA.
- Ervin, K.S., Milan, L.M., & Kennedy, F.T. (2004, May). *Army Personnel Surveys: Trust in Confidentiality?* Paper presented at the American Association for Public Opinion Research (AAPOR) Annual Conference, Phoenix, AZ.
- Fallesen, J. J. (2004, May). *Elements of Purpose-driven Leader Development*. Paper presented at the 40th International Applied Military Psychology Symposium, Oslo, Norway.
- Goodwin, G.F., O'Shea, P.G., Driskell, J.E., Salas, E., & Ardison, S.D. (2004, April). What makes a good team player? Development of a conditional reasoning test of team orientation. In Gustafson, S. (Chair) Making conditional reasoning test work: Reports from the frontier. Symposium conducted at the 19<sup>th</sup> Annual Conference of the Society for Industrial and Organizational Psychology Conference, Chicago, IL.

- Goodwin, G. F. & Halpin, S. M. (2004, April). Interactional Leader Development Process in the U.S. Army. In Kozlowski, S.W. (Chair) *An Exploration of the Dynamics of Adaptive Leadership*. Symposium conducted at the 19<sup>th</sup> Annual Conference of the Society for Industrial and Organizational Psychology, Chicago, IL
- Gramlich, A., Keller-Glaze, H. , Whetzel, D, Fallesen, J.J. (2003 November). *Effectiveness of Mentoring in the Army*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola Beach, FL.
- Hannah, S. & Reichard, R.J. (2004, June). *100 year leadership meta-analysis: An in-progress report*. Paper presented at the Inaugural Gallup Leadership Summit, Omaha, NE.
- Hanson, M. A., Paullin, C. J., Bruskiewicz, K. T., & White, L. A. (2003, November). *The Army Vocational Interest Career Examination*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Heffner, T. S., Tremble, T., Campbell, R., & Sager, C. E. (2003, November). *Anticipating the future for first-tour Soldiers*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Heffner, T. S., Campbell, R., Knapp, D., & Greenston, P. (2003, November). *Competency testing for the U.S. Army noncommissioned officer corps*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Heffner, T. S., Mathieu, J. E., Goodwin, G. F., & Salas, E. (2004, April). *Individual versus intact team training programs: An aptitude by treatment interaction approach*. Paper presented at the 19th Annual Conference of the Society for Industrial and Organizational Psychology, Chicago, IL.
- Heffner, T. S., Greenston, P., & Rumsey, M. G. (2004, April). *Enhancing the U. S. Army noncommissioned officer promotion system*. Paper presented at Defense Analysis Seminar XII, Seoul, Korea.
- Hill, R.W. Jr., Gordon, A., Kim, J. (2004, December) Learning the Lessons of Experience: Tools for Interactive Case Method Analysis. *Proceedings of the 24th Army Science Conference*, Orlando Florida.
- Horey, J. & Fallesen, J.J. (2003, November). *Leadership Competencies: Are we saying the same thing?* Paper presented at the 45th Annual Conference of the International Military Testing Association Conference, Pensacola Beach, Florida.
- Huffman, A. H., Payne, S. C., & Casper, W. J. (2004, April). A comparative analysis of work-family balance: Single-earner versus dual-earner family employees. In S. C. Payne & A. H. Huffman (Chairs), *The work-family interface over time: Longitudinal studies of work-family relationships*. Symposium presented at the 19<sup>th</sup> annual meeting of the Society for Industrial and Organizational Psychology Conference, Chicago, IL.

- Katz, L.C. (2003, November). *Aircrew Coordination Training Impact Assessment*. Paper presented at the 50<sup>th</sup> Human Factors & Ergonomics Technical Advisory Group Meeting, Tempe, AZ.
- Katz, L.C., & Grubb, G. (2003, December). *Evaluating distance learning delivery effects on mission safety and performance*. Paper presented at the Inter-service/Industry Training Simulation and Education Conference, Orlando, FL.
- Katz, L.C. (2004, April). *ACTE Phase III research*. Paper presented at the Distance Learning Conference, Hurlbert Field, Florida.
- Keenan, P. A., Katkowski, D. A., Collins, M. M., Moriarty, K. O., & Schantz, L. B. (2003, November). *Performance criteria for the Select 21 project*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Knerr, B.W. & Lampton, D.R. (2003, December). *Virtual Dismounted Soldier Simulation: Human Performance and Training Effectiveness*. Paper presented at the 2003 Interservice/Industry Training Systems and Education (IITSEC) Conference, Orlando, FL.
- Kring, J. P., Hamilton, R. H., Singer, M. J. (2004, September). Implications of team communication training for distributed team performance in an immersive virtual environment. *Proceedings of the Human Factors and Ergonomics Society 48<sup>th</sup> Annual Meeting* (pp. 2647-2651). Santa Monica, CA: Human Factors and Ergonomics Society
- Kring, J. P. (2004, October). *Distributed team training and performance in virtual environments*. Paper presented at Training for Tomorrow 2004, Houston, TX. Presentation available online at: <http://advtech.jsc.nasa.gov/t4t04.asp#archive>
- Lampton, D.R., Clark, B., & Knerr, B.W. (2003, October). *Urban Combat: The ultimate extreme environment*. Paper presented at the Society for Human Performance in Extreme Environments Conference, Denver, Colorado.
- LaVoie, N., Psotka, J., Lochbaum, K. E., & Krupnick, C. (2003, December). *Automated Tools for Distance Learning*. Paper presented at the Society for Applied Learning Technologies, Orlando, FL.
- Lee, W. C., & Drasgow, F. (2003, November). *Using decision tree methodology to predict attrition with the AIM*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Lee, J.K., & Tremble, T.R. (2004, April). *An Event History Analysis of First-Term Soldier Attrition*. Paper presented at the 19th Annual Conference of the Society for Industrial and Organizational Psychology, Chicago, IL.

- Lickteig, C. W., Sanders, W. R., Durlach, P. J., Carnahan, T. J., Lussier, J. W. & Sauer, G. (2003, December). *A focus on battle command: Human system integration for future command systems*. Paper H1217 presented at the 2003 Interservice/Industry Training, Simulation, and Education (I/ITSEC) Conference, Orlando, FL.
- Lickteig, C. W., Sanders, W. R., Durlach, P. J., Carnahan, T. J., & Lussier, J. W. (2004, April). *Human performance essential to battle command: Methods and findings on future command group performance*. Paper presented at the Defense Analysis Seminar XII, Seoul, Korea.
- Legree, P. J. & Psotka, J. (2003, November). *Measuring Knowledge Based Constructs*. Paper presented at the Emotional Intelligence Workshop at Educational Testing Services, Princeton, NJ.
- Legree, P. J. & Psotka, J. (2004, April). *Scoring Situational Judgment Tests Using Examinee Responses Without Criterion Data*. Paper presented at the Society for Industrial and Organizational Psychology Conference, Chicago, IL.
- Legree, P. J. & Psotka, J. (2003, December). *Consensus Based Measurement*. Paper presented at International Society for Intelligence Research Conference, Newport Beach, CA.
- Lozzi, D.E., Cracraft, M.L., McKee, S., Ployhart, R.E., & Zaccaro, S.J. (2004, March). *Assessing Adaptive Leadership Through New Measurement Technique*. Paper presented at APA Division 19/20 Mid-Year Meeting, Fort Belvoir, VA.
- Marshall, H., Hart, J., Stahl, J., Green, G., Dolezal, M., Durlach, P. Bowens, L. Neumann, J., & Burnett, R. (2003, October). *Issues in development of a virtual embedded training environment for control of robotic system in the future combat system (FCS)*. Paper presented at the Huntsville Simulation Conference, Huntsville, AL.
- McCloy, R. A., Putka, D. J., Van Iddekinge, C.H., & Kilcullen, R. N. (2003, November). *Developing operational personality assessments: Strategies for forced-choice and biodata-based measures*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Meliza, L.L. & Barnett, J.S. (2003). *Measuring Unit Proficiency in Applying C4I Systems*. Paper presented at the 39<sup>th</sup> Annual U.S. Army Operations Research Symposium, Fort Lee, VA, Oct. 10-12, 2003.
- Meliza, L.L., Lockaby, K. J., & Leibrecht, B.C. (2003, December). *Providing Feedback on Unit Employment of Vehicular Command, Control, and Communication Systems*. Paper presented at the 2003 Interservice/Industry Training Systems and Education (I/ITSEC) Conference, Orlando, FL.

- Meliza, L.L., Lockaby, K. J., Perrault, A.M., & Leibrecht, B.C. (2003, December). *Digital systems and battle staff integration: Collective training feedback*. Paper presented at the 2003 Interservice/Industry Training Systems and Education (I/ITSEC) Conference, Orlando, FL.
- Meliza, L.L., Begley II, I.J., & Anderson, L.. (2003, December). *Centralized training analysis facility for live training*. Paper presented at the 2003 Interservice/Industry Training Systems and Education (I/ITSEC) Conference, Orlando, FL
- Mitchell, D., Keller-Glaze, H., Gramlich, A. & Fallesen, J.J. (2003, November). *Predictors of U.S. Army Captain Retention Decisions*. Paper presented at the 45th Annual Conference of the International Military Testing Association Conference, Pensacola Beach, Florida.
- Nourizadeh, S. (2003, November). *Using Survey and Interview Data: An Example*. Paper presented at the International Military Testing Association Conference, Pensacola Beach, Florida.
- Orvis, K.L. & Zaccaro, S.J. (2004, April). The importance of leadership processes in co-located and distributed teams. In J.S. Lyons (Chair) & S. Weisband (Co-Chair), *E-leadership: Diverse perspectives on leadership at a distance*. Symposium conducted at the 19<sup>th</sup> Annual Society for Industrial Organizational Psychology (SIOP) Conference, Chicago IL.
- Putka, D. J., Van Iddekinge, C. H., & Sager, C. E. (2003, November). *Developing measures of occupational interests and values for selection*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Reichard, R.J. (2004, June). *Leader self-development as Organizational Strategy*. Roundtable presentation at the Inaugural Gallup Leadership Summit Omaha, NE.
- Ross, K. G., Phillips, J. Battaglia, Domeshek, E. A. & Lussier, J. W. (2003, December). *Mental Models Underlying Tactical Thinking Skills*. Paper E1196 presented at the 2003 Interservice/Industry Training, Simulation, and Education Conference, Orlando, FL.
- Sabol, M., Schaab, B., Dressel, D., & Rittman, A. (2003, November). *Success at collaboration as a function of knowledge depth*. Paper presented at the annual meeting of the International Military Testing Association (IMTA), Pensacola, Florida.
- Sabol, M., Schaab, B., & Dressel, D. (2003, November). *What today's Soldiers tell us about training for the future*. Paper presented at the annual meeting of the International Military Testing Association Conference, Pensacola Beach, Florida.

- Sager, C. E., & Russell, T. L. (2003, November). *Future-oriented job analysis for first-tour Soldiers*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Schaab, B. (2003, November). *What Today's Soldiers Tell Us About Training for the Future*. Paper presented at the International Military Testing Association Conference, Pensacola Beach, Florida.
- Shadrick, S.B., Heiden, C., & Gossman, J. R. (2004, June). *Training Battle Command Thinking Skills with Distance Mentoring: A Comparison of 3 Methods*. Paper presented at the Annual Symposium of the Military Operations Research Society, Monterey, CA.
- Shadrick, S.B. (2004, June). *Training Adaptive Thinking with the Think Like a Commander*. Paper presented at the National Guard Distributed Learning Workshop, Indianapolis, IN.
- Stark, S. E., Chernyshenko, O. S., & Drasgow, F. (2003, November). *A new approach to constructing and scoring resistant personality measures*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Steinberg, A. (2003, November). *Using Results from Attitude and Opinion Surveys*. Paper presented at the International Military Testing Association Conference, Pensacola Beach, Florida.
- Streeter, L. A., LaVoie, N. Krupnick, C., and Psotka, J. (2004, June). *Automated Content Assessment Tools for e-Learning Environments*. Paper presented at the International Conference for the Learning Sciences, Santa Monica, CA.
- Tremble, T. R., & Rumsey, M. G. (2004, April). *Personnel measures for the selection and assignment of new Soldiers to future duty positions*. Paper presented at Defense Analysis Seminar XII, Seoul, Korea.
- Van Iddekinge, C. H., Putka, D. J., & Sager, C. E. (2003, November). *Assessing person-environment (P-E) fit within the future Army*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.
- Van Iddekinge, C. H., Sager, C. E., Burnfield, J. L., & Heffner, T. S. (2004, April). *A closer look at differences in interviewer validity and reliability*. Paper presented at the 19th Annual Conference of the Society for Industrial and Organizational Psychology, Chicago, IL.
- Waugh, G. W., & Russell, T. L. (2003, November). *Scoring both judgment and personality in a situational judgment test*. Paper presented at the 45th Annual Conference of the International Military Testing Association, Pensacola, FL.

Young, M. C. (2004, April). *Effects of retesting on a new Army measure of motivational attributes*. Paper presented at the Mid-Atlantic Personnel Assessment Consortium, Washington, D. C.

Young, M.C., White, Leonard A., Heggstad, E.D., & Barnes, J.D. (2004, August). *Operational validation of the Army's new pre-enlistment attrition screening measure*. Paper presented at the American Psychological Association (APA) Conference, Honolulu, HI.

### **FY 2004 Poster Presentations**

Durlach, P. J. (2004, November). Army digital systems and vulnerability to change blindness. Paper presented at the 24<sup>th</sup> Annual Army Science Conference, Orlando, FL.

Neumann, J. L. & Durlach, P.J. (2004, September). *The effect of practice on visual change detection in computer displays*. Human Factors and Ergonomics Society, New Orleans, LA.

Orvis, K. L. & Belanich, J. (April, 2004). Leadership and team trust. Poster session presented at the APA Midyear Symposium: Contemporary & Emerging Issues in Human Factors, Engineering and Military Psychology (Division 21: Applied Experimental and Engineering Psychology), Fort Belvoir, VA.

Pleban, R.J., & Salvetti, J. (2003, October). *Using Virtual Environments for Conducting Small Unit Mission Rehearsals*. Poster presented and paper published in the Proceedings of the Human Factors and Ergonomic Society 47<sup>th</sup> Annual Meetings (pp.2064 – 2068), Denver, CO

Reichard, R.J. (2004, April). *Toward a grounded theory of female leadership development*. Poster session presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Chicago, IL.

Zhu, W. & Reichard, R.J. (2004, June). *A missing link between transformational leadership and individual and collective identification: Role of psychological empowerment*. Poster session presented at the Inaugural Gallup Leadership Summit Omaha, NE.

### **FY 2004 Journal Articles**

Belanich, J., Orvis, K. L., & Wisher, R. A. (2004). A question-collaboration approach to distance learning. *The American Journal of Distance Education* 18(3), 169-185.

- Christ, R.E. (2003, October) Training Rapid Decision-Making Processes Required by the Dismounted Objective Force Leader (Abstract of a panel session). *Proceedings of the 47<sup>th</sup> Annual Meeting of the Human Factors and Ergonomics Society*, Denver, CO
- Durlach, P.J. (2004). Change blindness and its implications for complex monitoring and control systems. *Human-Computer Interaction*, 19, 423-451.
- Gordon, A. S. & Nair, A. (2004, August) Expressions Related to Knowledge and Belief in Children's Speech. *Proceedings of the 26th Annual Meeting of the Cognitive Science Society* (CogSci-2004), Chicago. Mahwah, NJ: Lawrence Erlbaum Associates.
- Gordon, Andrew S. & Hobbs, Jerry R. (2004) Formalizations of Commonsense Psychology. *AI Magazine* 25(4):49-62.
- Hagman, J.D. (2004, March-April). Predicting live-fire marksmanship: A simulation-based tool for the RD trainer. *Infantry*, 93(2), 44-45.
- Hill, R.W. Jr., Gordon, A., & Kim, J. (2004, December) Learning the Lessons of Experience: Tools for Interactive Case Method Analysis. *Proceedings of the 24th Army Science Conference*, Orlando Florida.
- Jerome, C.J.. & Witmer, B.G. (2004, September). Human performance in virtual environments: Effects of presence, immersive tendency, and simulator sickness. *Proceedings of the Human Factors and Ergonomic Society (HFES) Conference*, New Orleans, LA, 2613-2617.
- Johnson, D. M., & Couch, M. (Winter 2004). Simulation-based BUCS training for the AH-64A Apache. *Simulation Operations Quarterly Newsletter*, 1(2), 15-16.
- Kirkley, J.R., Kirkley, S.E., Myers, T.E., Lindsay, N., & Singer, M.J. (December, 2003). Problem-based embedded training: An instructional methodology for embedded training using mixed and virtual reality technologies. *Proceedings of the 25<sup>th</sup> Interservice/Industry Training Systems and Education Conference*. Arlington, VA: National Training Systems Association.
- Kring, J. & Barnett, J.S. (2004). *Expert judgments of the most critical environmental and psychological variables in spaceflight* [Abstract]. *Habitation* 9 (3/4) 161-162.
- Kring, J. P., Cuevas, H. M., Barnett, J., Lampton, D. L., & Fletcher, J. F. (2004, March). *Human performance in extreme environments: From the battlefield to the final frontier*. In D. A. Vincenzi, M. Mouloua, and P. A. Hancock (Eds.), *Human Performance, Situation Awareness, and Automation: Current Research and Trends. Proceedings of the Second Human Performance, Situation Awareness, and Automation Conference [HPSAA II]*, Daytona Beach, FL. Mahwah, NJ: Lawrence Erlbaum.



- Lampton, D.R., Clark, B., & Knerr, B.W. (2003, Fall/Winter). Urban Combat: The ultimate extreme environment. *Journal of Human Performance in Extreme Environments*, 7(2), 57-62.
- Legree, P. J. (2003, October). Buckle up for safety. *Contemporary Psychology*, 48, 635-636.
- Psotka, J., Streeter, L., Landauer, T., Lochbaum, K., and Robinson, K. (2003, October). Augmenting electronic environments for leadership. In *Advanced Technologies for Military Training: Proceedings No. RTO-MP-HFM-101-21 of the Human Factors in Medicine Panel*, Genoa, Italy, Research and Technology Organization, Neuilly-sur-Seine: France. pp. 305-322.
- Schumm, W.R., Bell, D.B., Ender, M.G. & Rice, R.E. (2004, Summer). Expectations, use, and evaluation of communication media among deployed peacekeepers. *Armed Forces and Society*, 30 (4), 649-653.
- Singh, H., & O'Boyle, M.W. (2004, April). Interhemispheric interaction during global-local processing in mathematically gifted adolescents, average ability youth, and college students. *Neuropsychology*, 18, 371-377.
- Witmer, B.G., Jerome, C.J., & Singer, M.J. (2004). The factor structure of the presence questionnaire. *Presence*.
- Zaccaro, S. J., Aridson S. D., & Orvis K. L. (2004). Leadership in virtual teams. In D. Day, S. Zaccaro, & S. Halpin (Eds.), *Leader development for transforming organizations* (pp. 267-292). Mahwah, NJ: Lawrence Erlbaum Associates.